

**WHAT IS CLAIMED IS:**

1. A method for assigning a predetermined wavelength between two different nodes in a wavelength division multiplexing ring communication network that has an N number of nodes and at least one pair of optical fibers sequentially connecting the N number of nodes, the method comprising the steps of:

forming a matrix that represents optical-path configuration and wavelength assignment for an N-1 number of nodes;

extending the matrix by adding a column at any position of the matrix and then assigning X to locations of the added column;

10 adding an N/2 number of rows in the matrix;

tracking along each row toward the left, from the added column, to find a first encountered numeral and increasing the found numeral by one;

assigning numerals 1, 2, ..., N/2 sequentially to locations corresponding to the added column in the added rows, and assigning X to locations next to the numeral-assigned locations, the number of X-assigned locations being equal to a hop-number corresponding to the assigned numeral minus 1; and

tracking along each of the added rows toward the right to find an empty location and assign thereto a numeral not used, among the numerals 1, 2, ..., N/2, in the same column as the empty location and assigning X to locations next to the empty location, the number of X-assigned locations being equal to a hop-number corresponding to the assigned

numeral minus 1,

where N being an even number, and X representing that an optical path of the corresponding node is not formed.

2. The method as set forth in claim 1, wherein the step of forming the matrix  
5 comprises the steps of:

preparing the matrix having rows and columns, a number of rows being equal to a number of nodes (N-1), a number of columns being equal to a lower limit value W of the number of wavelengths required when the number of nodes is N-1;

10 assigning a set of numerals {1, 2, ..., Lmax} sequentially to locations of a first column of the matrix, while assigning X to a location where no numeral is assigned, and assigning X to locations next to a numeral-assigned locations along each row, the number of X-assigned locations being equal to a hop-number corresponding to the assigned numeral minus 1; and

15 shifting one by one toward the right in the matrix to assign a rotated set of numerals sequentially to each column, the rotated set of numerals being obtained by rotating a set of numerals used in the previous column, and assigning X to the remaining locations.

3. The method as set forth in claim 2, wherein when the number of nodes is N-1, a lower limit value W is given by:

$$W = \{(N-1)^2 - 1\} / 8.$$

4. A method for assigning a predetermined wavelength between two different nodes, in case where a number of nodes is increased, in a wavelength division multiplexing ring communication network that has an N number of nodes and at least one pair of optical fibers sequentially connecting the N number of nodes, the method comprising the steps of:

5       expressing, by a matrix, optical-path configuration and wavelength assignment of the network before extending the number of nodes;

          extending the matrix by adding a column to extend the number of nodes at a corresponding position of the matrix and then assigning X to the added column;

          tracking along each row toward the left, from the added column, to find a first  
10   encountered numeral and increasing the found numeral by one, and, if the numeral exceeds a maximum number of hops ( $L_{\max} = (N-1)/2$ ) after being increased, modifying the numeral to a hop-number from a column corresponding to the first-encountered numeral to the added column;

          tracking along each row toward the right, from the added column, to find a firstly  
15   encountered numeral and assigning, to each row of the added column, a hop-number from the added column to a column corresponding to the firstly-encountered numeral; and

          assigning X to an empty location of the added column,

          where N being an odd number, and X representing that an optical path of the corresponding node is not formed.